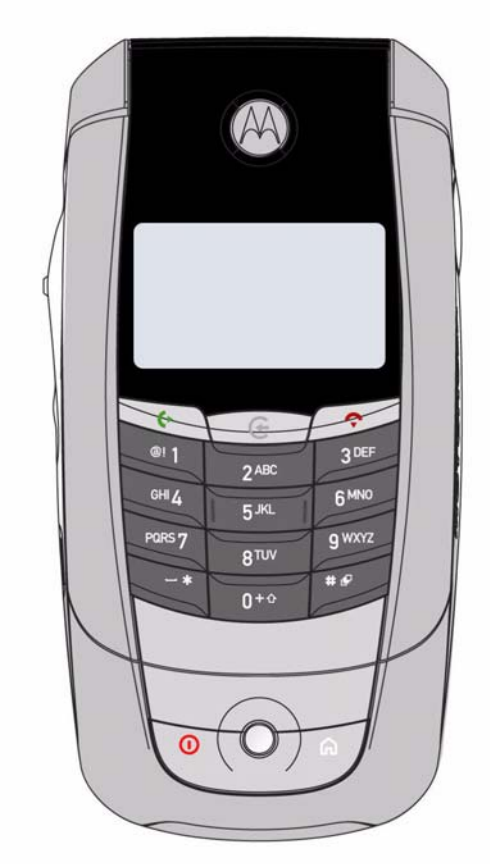
MOTOROLA

Level 1 and 2 Service Manual

A780
Digital Wireless Telephone



850, 900, 1800, and 1900MHz

Introduction

Motorola® Inc. maintains a worldwide organization that is dedicated to provide responsive, full-service customer support. Motorola products are serviced by an international network of company-operated product-care centers as well as authorized independent service firms.

Available on a contract basis, Motorola Inc. offers comprehensive maintenance and installation programs that allow customers to meet requirements for reliable, continuous communications.

To learn more about the wide range of Motorola service programs, contact your local Motorola products representative or the nearest Customer Service Manager.

Product Identification

Motorola products are identified by the model number on a label usually located under the battery. Use the entire model number when inquiring about the product. Numbers are also assigned to chassis and kits. Use these numbers when requesting information or ordering replacement parts.

Product Names

Product names are listed on the front cover. Product names are subject to change without notice. Some product names, as well as some frequency bands, are available only in certain markets.

Product Changes

When electrical, mechanical or production changes are incorporated into Motorola products, a revision letter is assigned to the chassis or kit affected, for example; -A, -B, or -C, and so on.

The chassis or kit number, complete with revision number, is imprinted during production. The revision letter is an integral part of the chassis or kit number and is also listed on schematic diagrams and printed-circuit board layouts.

Regulatory Agency Compliance

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

- This device may not cause any harmful interference
- This device must accept interference received, including interference that may cause undesired operation

This class B device also complies with all requirements of the Canadian Interference-Causing Equipment Regulations (ICES-003).

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Computer Program Copyrights

About This Service Manual

Use of this manual assures proper installation, operation, and maintenance of Motorola products and equipment. It contains all service information required for the equipment described and is current as of the printing date. Refer questions about this manual to the nearest Customer Service Manager.

Audience

This manual aids service personnel in testing and repairing A780 telephones. Service personnel should be familiar with electronic assembly, testing, and troubleshooting methods, and with the operation and use of associated test equipment.

Scope

This manual provides basic information relating to A780 telephones, and also provides procedures and processes for repairing the phones at Level 1 and 2 service centers including:

- Unit swap out
- Repairing of mechanical faults
- Basic modular troubleshooting
- Testing and verification of unit functionality
- Initiate warranty claims and send faulty modules to Level 3 or 4 repair centers

Conventions

The following special characters and typefaces, are used in this manual to emphasize certain types of information.

Note: Emphasizes additional information pertinent to the subject matter.

Caution: Emphasizes information about actions which may result in equipment damage.

Warning: Emphasizes information about actions which may result in personal injury.

Keys to be pressed are represented graphically. For example, instead of "Press the Menu Key", you will see "Press ".

Information from a screen is shown in text as similar as possible to what displays on the screen. For example, ALERTS or **ALERTS**.

Information that you need to type is printed in **boldface type.**

Warranty Service Policy

The product is sold with the standard 12-month warranty terms and conditions. Accidental damage, misuse, and extended warranties offered by retailers are not supported under warranty. Non-warranty repairs are available at agreed fixed repair prices.

Out-of-Box Failure Policy

The standard out-of-box failure criteria applies. Return customer units that fail very early on after the date of sale to Manufacturing for root cause analysis, to guard against epidemic criteria. Manufacturing to bear the costs of early life failure.

Product Support

Customer's original units will be repaired but not refurbished as standard. Appointed Motorola Service Hubs will perform warranty and non-warranty field service for level 2 (assemblies) and level 3 (limited PCB component). Motorola High Tech Centers will perform level-4 (full component) repairs.

Customer Support

Customer support is available through dedicated Call Centers and in-country help desks. Product Service training is available through the local Motorola Support Center.

Parts Replacement

When ordering replacement parts or equipment, include the Motorola part number and description used in the service manual.

When the Motorola part number of a component is not known, use the product model number or other related major assembly along with a description of the related

major assembly and of the component in question.

In the U.S.A., to contact Motorola, Inc. on your TTY, call: 800-793-7834.

Accessories and Aftermarket Division (AAD)

Order replacement parts, test equipment, and manuals from AAD.

U.S.A.	**Outside U.S.A.**
Phone: 800-422-4210	Phone: 847-538-8023
FAX: 800-622-6210	FAX: 847-576-3023

For EMEA spare parts call + 49 461 803 1638.

For Asia spare parts call +65 648 62995.

Specifications

General Function	Specification
Frequency Range GSM 850	824-848 MHz Tx 869-893 MHz Rx
Frequency Range GSM 900	880-915 MHz Tx (with EGSM) 925-960 MHZ Rx
Frequency Range DCS 1800	1710-1785 MHz Tx 1805-1880 MHz Rx
Frequency Range PCS 1900	1850-1910 MHz Tx 1930-1990 MHz Rx
Channel Spacing	200 kHz
Channels	174 EGSM, 374 DCS, 374 PCS, 124 GSM 850 carriers with 8 channels per carrier
Modulation	GMSK at BT = 0.3
Transmitter Phase Accuracy	5 Degrees RMS, 20 Degrees peak
Duplex Spacing	45 MHz
Frequency Stability	± 0.10 ppm of the downlink frequency (Rx)
Operating Voltage	+3.2V dc to +5.5V dc (cell) +4.8V dc to +6.5V dc (external charger)
Transmit Current Drain	80-160 mA average talk current drain
Stand-by Current Drain	5 mA (DRX2), 2 mA (DRX9) typical
Dimensions, with 1000 mAhr Li Ion battery	49.2mm x 89.2mm x 28mm (excluding antenna) (1.94 inches x 3.51 inches x 1.10 inches)
Size (Volume)	97 cc (5.91 in^3)
Weight	148.3 gm (5.01 oz) with battery
Temperature Range	-10° C to +55° C (+15° F to +130° F)
Battery Life, with standard 1000 mAhr Li-Ion Battery	Talk time 6.3 Hrs Standby time 210 Hrs.
	All talk and standby times are approximate and depend on network configuration, signal strength, and features selected. Standby times are quoted as a range from DRX=2 to DRX=9. Talk times are quoted as a range from DTX off to DTX on.
Battery Charge Time	1.75 hours to 90% of 1000mAhr capacity

Transmitter Function	Specification
RF Power Output	32 dBm nominal GSM 900, 29 dBm nominal GSM 1800
Output Impedance	50 ohms nominal
Spurious Emissions	-36 dBm from 0.1 to 1 GHz, -30 dBm from 1 to 4 GHz

Receiver Function	Specification
Receive Sensitivity	Better than -103 dBm
RX Bit Error Rate (100k bits) Type II	< 2%

Speech Coding Function	Specification
Speech Coding Type	Regular pulse excitation/linear predictive coding with long term prediction (RPE LPC with LTP)
Bit Rate	13.0 kbps
Frame Duration	20 ms
Block Length	260 bits
Classes	Class 1 bits = 182 bits; Class 2 bits = 78 bits
Bit Rate with FEC Encoding	22.8 kbps

Product Overview

Motorola A780 telephones feature global system for mobile communications (GSM) air interface, general packet radio service (GPRS) transport technology, enhanced Date Rate for Global Evolution (EDGE) and wireless application protocol (WAP) Internet. The A780 incorporate a new user interface (UI) for easier operation, allows short message service (SMS) text messaging, and includes personal information manager (PIM) functionality.

The A780 is a quad-band phone that allows roaming within the GSM 900 MHz, (DCS) 1800 MHz digital cellular system, the GSM 850 MHz, and PCS 1900 MHz bands.

A780 telephones support GPRS, SMS and EDGE in addition to traditional circuit switched transport technologies.

A780 telephones have a clam form factor. They are made of a polycarbonate plastic with the earpiece speaker located in the flip. The flip features a viewing window that allows a portion of the display to be seen with the flip is closed. The bottom part of the clam (front housing) contains the touch screen display, main printed circuit board (PCB), microphone, external accessory connector, infrared (IR) communications port, and headset jack. Also located in the front housing are the voice, volume, power, page up, page down, and menu buttons, as well as the battery, antenna, subscriber identity module (SIM) holder, and status light. A stylus, also located in the front housing, is provided to aid manipulating the touch screen UI. The standard 1000 mAh Lithium Ion (Li Ion) battery fits behind a removable back cover.

The phone accepts both 1.875V and 3V mini subscriber identity module (SIM) cards which fit into the SIM holder underneath the battery. The antenna is a fixed stub type antenna. Inexpensive direct connection to a computer or handheld device via RS232 or USB for data and fax calls, and for synchronizing phonebook entries with TrueSync® software, can be accomplished by using the optional data cable and soft modem.

Features

A780 telephones use advanced, self-contained, sealed, custom integrated circuits to perform the complex functions required for GPRS/EDGE communication. Aside from the space and weight advantage, microcircuits enhance basic reliability, simplify maintenance, and provide a wide variety of operational functions.

Features available in this family of telephones include:

- Integrated high audio hands-free speakerphone
- Dedicated on off speakerphone button
- Quad-Band
- Multi-Media Messaging (MMS)
- Integrated digital camera (VGA quality) with zoom and brightness adjustment
- Two polyphonic speakers w/ MP3, MIDI, & WAV ringers
- Stylish and Ergonomic design
- 5 megabytes of end user memory
- Large, active color display (176 x 220, 65K)
- Games (embedded & downloadable)
- PIM functionality with Picture Caller ID
- Downloadable themes (ringers, images, animations)

Speaker Dependant Voice Activation and Voice Note Recording

Voice tags can be used for voice dialing up to 20 phone numbers in the phone book and for creating up to 5 voice shortcuts for menu items. The phone must be "trained" by the voice tag being read into the phone's memory twice before it is recognized.

You can add voice tags to the phone's memory using the usual name addition methods (i.e., via the phone book menu structure or with the shortcut editor).

You cannot place or receive calls while adding voice tags to the phone's memory.

Because the GSM standard does not provide the option to store voice tags onto the SIM card, voice tags are added to the phone's memory.

A780 telephones also include a voice note recorder that allows up to 2 minutes of personal messages to be recorded. This feature has a complete set of record, playback, and management tools that make it easy to store and maintain a list of personal memos.

Wireless Access Protocol (WAP) 2.0 Compliancy

In the WAP environment, access to the Internet is initiated in wireless markup language (WML), which is derived from hypertext markup language (HTML). The request is passed to a WAP gateway which retrieves the information from the server in standard HTML (subsequently filtered to WML) or directly in WML if available. The information is then passed to the mobile subscriber via the mobile network.

The A780's microbrowser can be configured for baud, idle timeout, line type, phone number, and connection type.

Bitmap image data will download as text. If the image is larger than the screen, only part of the image will display.

When the user receives a call while in browser mode, the browser will pause and allow the user to resume after completing the call.

SIM Application Toolkit™ - Class 2

SIM Application Toolkit is a value-added service delivery mechanism that allows GSM operators to customize the services they offer their customers, from the occasional user who requests sports news and traffic alerts, to a high call time business user who receives stock alerts and checks flight times. Operators can now create their own value-added services menu quickly and easily in the phone. The customized menu will appear as the first menu and may be updated over-the-air with new services when customers request them.

Simplified Text Entry

There are three different ways to enter text using the phone keypad:

- iTAP™ predictive text entry. Press a key to generate a character and a dynamic dictionary uses this to build and display a set of word or name options. The iTAP™ feature may not be available on the phone in all languages.
- Tap. Press a key to generate a character.
- Numeric. The keypad produces numeric characters only. For some text areas this is the only method available; for example, phone numbers.

Caller Line Identification

Upon receipt of a call, the calling party's phone number is compared to the phone book. If the number matches a phone book entry, that name will be displayed. If there is no phone book entry, the incoming phone number will be displayed. In the event that no caller identification information is available, the Incoming Call message is displayed.

User must subscribe to a caller line identification service through their service provider.

Other Features

Detailed descriptions of these and other A780 features can be found in the appropriate user's guide listed in the "Related Publications" section toward the end of this manual.

General Operation

Controls, Indicators, and Input / Output (I/O) Connections

The A780 telephone's controls are located on the sides of the device and on the keypad. Indicators, in the form of icons, are displayed on the LCD (see Figure 2). A780 phones have an audible alert transducer on the top and I/O connectors, consisting of a headset jack and an accessory port, located on the top and bottom of the phone. See Figure 1.

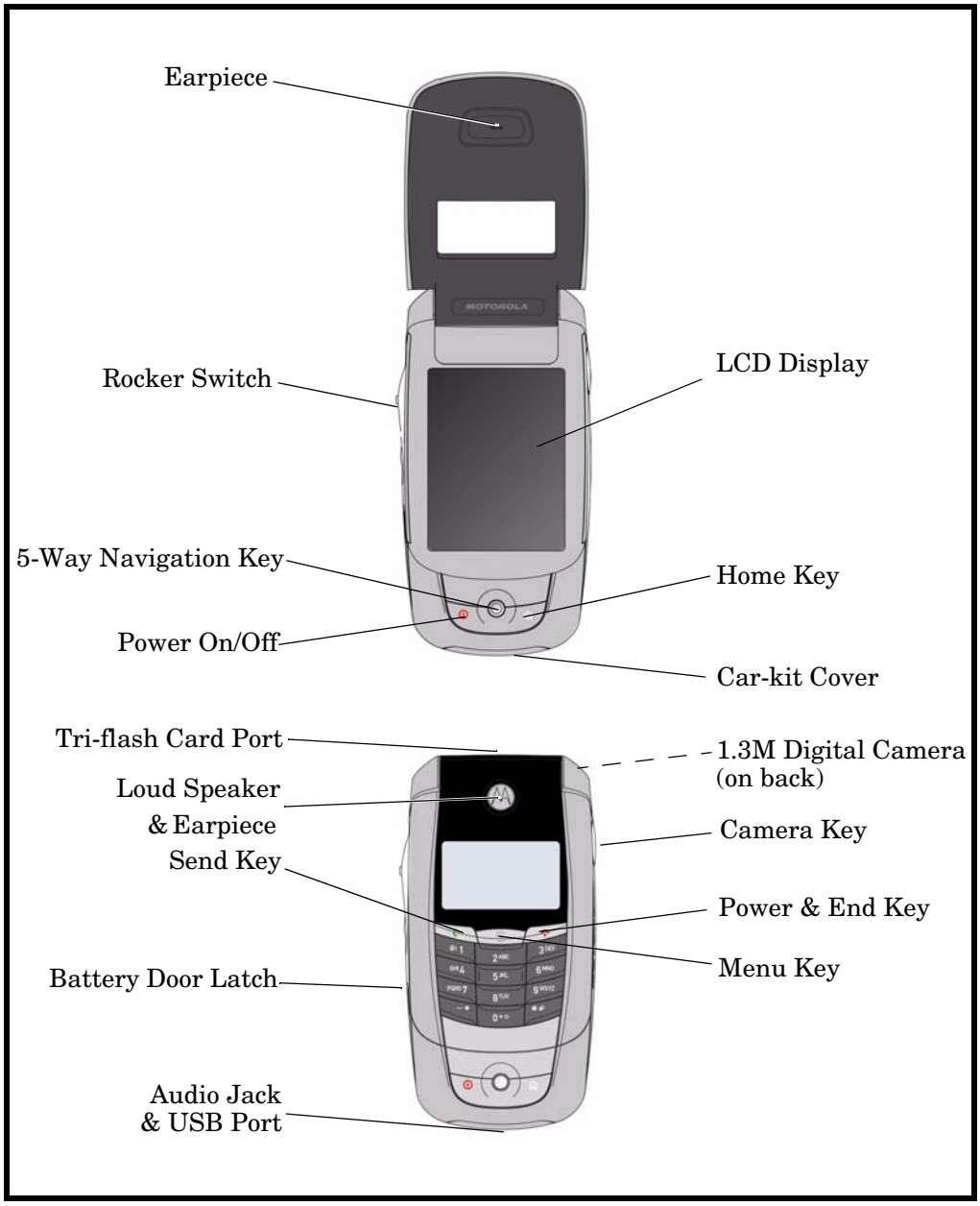


Figure 1. Controls, indicators, and I/O

"Soft keys" refer to non-labeled keys that correspond to text options displayed on the screen. The left and right soft keys perform the function shown in the corners of the display. The right key will usually select an option whereas the left key will usually exit a function or return to a previous screen.

The menu key opens the initial menu structure, or allows access to a submenu whenever ☰ appears on the display.

Color Display

The A780 wireless phones feature a 64k color Thin Film Transistor (TFT) 176x220 pixel display.

Display animation makes the phone's menus move smoothly as the user scrolls up and down Turn animation off to conserve the battery.

The following indicators can display in the status bar:

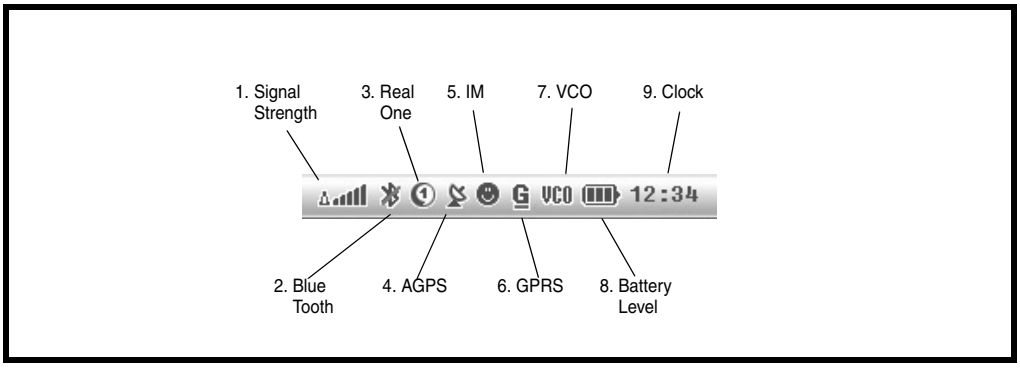


Figure 2. Icon Indicators

Figure 2 shows some common icons displayed on the LCD.

1. Signal Strength Indicator – Vertical bars show the strength of the network connection. You cannot make or receive calls when the (no signal) indicator or (no transmit) indicator is displayed.

2. Bluetooth® Indicator – Shows that your phone has established a Bluetooth wireless connection with a headset accessory or other external device.

3. RealOne – Multi media

4. AGPS – Assisted GPS using additional non-GPS data inputs.

5. IM – Instant Message received

6. GPRS –

7. VCO – Voice carry over used with TTY.

8. Battery Level Indicator – Vertical bars show the battery charge level. Recharge the battery when **Low Battery** displays and the battery alert sounds.

9. Clock – Shows the current time.

Alert Settings

A780 telephones include up to 32 preset alert tones and vibrations that can be applied to all alert events at the same time.

Pressing either volume key will mute the alert.

Battery Function

Battery Gauge

The telephone displays a battery level indicator icon in the idle screen to indicate the battery charge level. The gauge shows four levels: 100%, 66%, 33%, and Low Battery.

Battery Removal

Removing the battery causes the device to immediately shut down and any pending work (for example, partially entered phone book entries or outgoing messages) is lost.

To ensure proper memory retention, turn OFF the phone before removing the battery. Immediately replace the old battery with a fresh battery.

If the battery is removed while receiving a message, the message will be lost.

Operation

For detailed operating instructions, refer to the appropriate User's Guide listed in the Related Publications section toward the end of this manual.

Tools and Test Equipment

The following table lists tools and test equipment recommended for disassembly and reassembly of A780 telephones. Use either the listed items or equivalents.

Table 1. General Test Equipment and Tools

Motorola Part Number[1]	Description	Application
RSX4043-A	Torque Driver	Used to remove and replace screws
--	#0 Cross Point Screwdriver	Used to remove cross point screws in the flip assembly
—	Torque Driver Bit T-6 Plus, Apex 440-6IP Torx Plus or equivalent	Used with torque driver
See Table 7	Rapid Charger	Used to charge battery and to power device
0180386A82	Antistatic Mat Kit (includes 66-80387A95 antistatic mat, 66-80334B36 ground cord, and 42-80385A59 wrist band)	Provides protection from damage to device caused by electrostatic discharge (ESD)
6680388B67	Disassembly tool, plastic with flat and pointed ends (manual opening tool)	Used during assembly/disassembly of device
6680388B01	Tweezers, plastic	Used during assembly/disassembly
—	Digital Multimeter, HP34401A[2]	Used to measure battery voltage
8102430Z04	GSM / DCS Test SIM	Used to enable manual test mode

1. To order in North America, contact Motorola Aftermarket and Accessories Division (AAD) at (800) 422-4210 or FAX (800) 622-6210; Internationally, AAD can be reached by calling (847) 538-8023 or faxing (847) 576-3023.
2. Not available from Motorola. To order, contact Hewlett Packard at (800) 452-4844.

Disassembly

The procedures in this section provide instructions for the disassembly of A780 telephones. Tools and equipment used for the phone are listed in Table 1, preceding.

Many of the integrated devices used in this equipment are vulnerable to damage from electrostatic discharge (ESD). Ensure adequate static protection is in place when handling, shipping, and servicing the internal components of this equipment.

Avoid stressing the plastic in any way to avoid damage to either the plastic or internal components.

Removing and Replacing the Battery Door and Battery

All batteries can cause property damage and/or bodily injury such as burns if a conductive material such as jewelry, keys, or beaded chains touch exposed terminals. The conductive material may complete an electrical circuit (short circuit) and become quite hot. Exercise care in handling any charged battery, particularly when placing it inside a pocket, purse, or other container with metal objects.

1. Ensure the phone is turned off.
2. Press in and hold the battery door latch as shown in Figure 1.

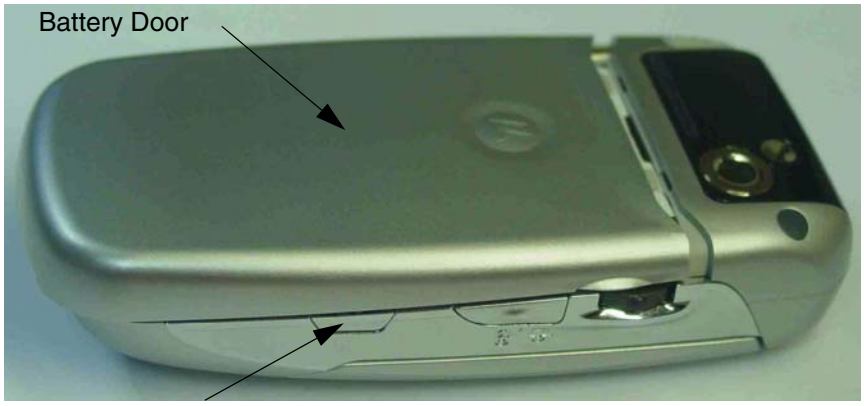


Figure 1. Removing the battery door

3. Slide the battery cover and lift it completely off the phone.

4. Lift the top end of the battery and remove it completely. See Figure 2.

Figure 2. Removing the battery

There is a danger of explosion if the Lithium Ion battery is replaced incorrectly. Replace only with the same type of battery or equivalent as recommended by the battery manufacturer. Dispose of used batteries according to the manufacturer's instructions.

5. To replace, Align the battery with the battery compartment so the contacts on the battery match the battery contacts in the phone.
6. Insert the battery, printed arrow first, into the battery compartment and push down.
7. Insert the battery housing into the base of the phone, then slide the cover toward the top of the phone until it snaps into place.

Removing and Replacing the Subscriber Identity Module (SIM)

1. Remove the battery door and battery as described in the procedures.

Figure 3. Removing the SIM

2. Carefully slide the SIM toward the bottom of the phone and lift it out.
3. To replace, insert the SIM into the holder, ensuring the keyed corner of the SIM aligns with the notch molded into the holder.
4. Replace the battery and battery door as described in the procedures.

Removing and Replacing the Rear Housing

This product contains static-sensitive devices. Use anti-static handling procedures to prevent electrostatic discharge (ESD) and component damage.

1. Remove the battery cover battery and SIM card as described in the procedures.
2. Slide the stylus from its holder. Use the metal tweezers to remove the rubber screw cover at the top right of the phone. Retain the screw cover for reassembly.
3. Using a Torx driver with a T-6 bit, remove the 4 screws at each corner of the unit and remove the back housing. Retain the screws for reassembly. See Figure 4.

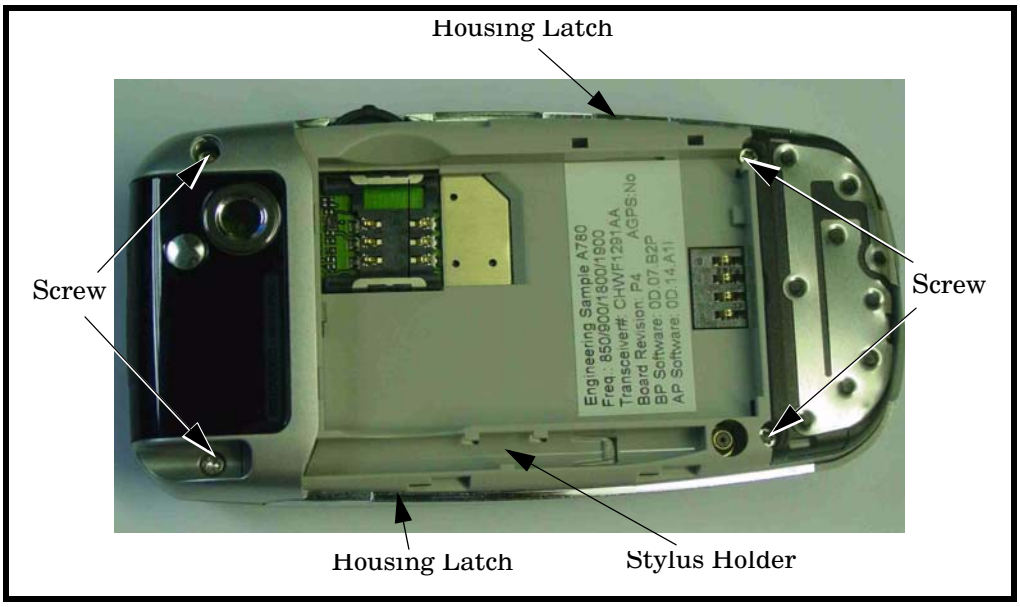


Figure 4. Removing the rear housing screws

4. Release the two housing latches by inserting the flat end of the plastic disassembly tool into side of the rear housing to disengage the latch.

5. Carefully lift the rear housing away from the front housing and flip assembly.

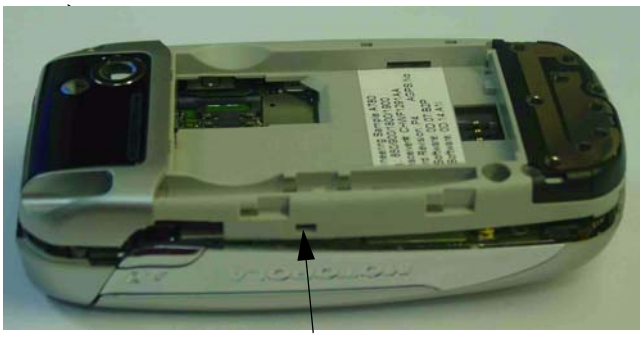


Figure 5. Removing the rear housing

6. To replace, carefully align the rear housing to the front housing and the flip assembly, then press the rear chassis assembly down until the 2 housing catches engage with the corresponding openings on the rear chassis assembly. Press the housings together until the catches snap into place.
7. Replace the 4 screws and tighten to a final torque setting of 1.5 inch pounds or. Do not over tighten.
8. Replace the rubber screw cover at the top right of the unit.
9. Replace the SIM card, battery, stylus and battery cover as described in the procedures.

Removing and Replacing the Transceiver Board Assembly

This product contains static-sensitive devices. Use anti-static handling procedures to prevent electrostatic discharge (ESD) and component damage.

1. Remove the battery cover, battery, SIM card, stylus, and rear housing as described in the procedures.

The flexible printed cable (FPC) (flex) is easily damaged. Exercise extreme care when handling.

2. Carefully work the flat end of the disassembly tool under the flex connector and remove the connector from the transceiver board. See Figure 6.

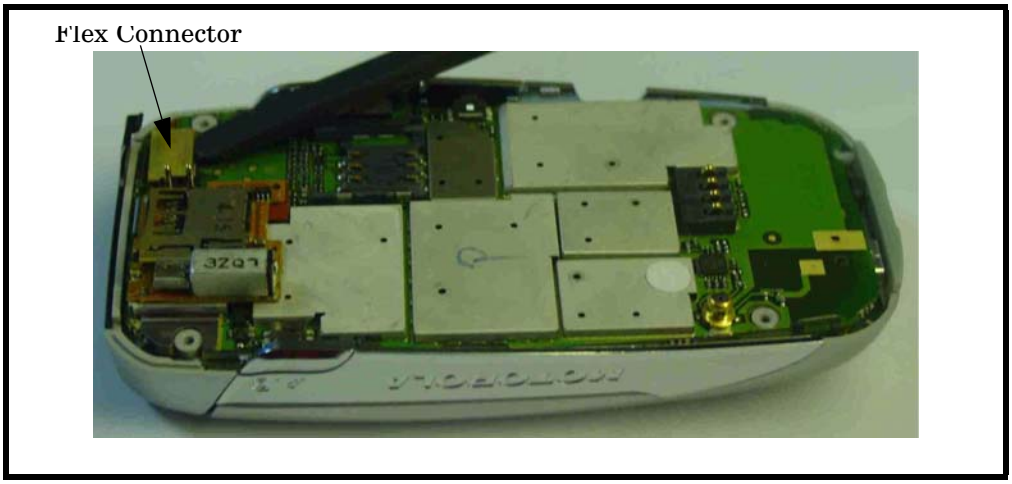


Figure 6. Disconnecting the Flex from the Transceiver Board

3. Lift the transceiver board assembly out of the front housing. See Figure 7.

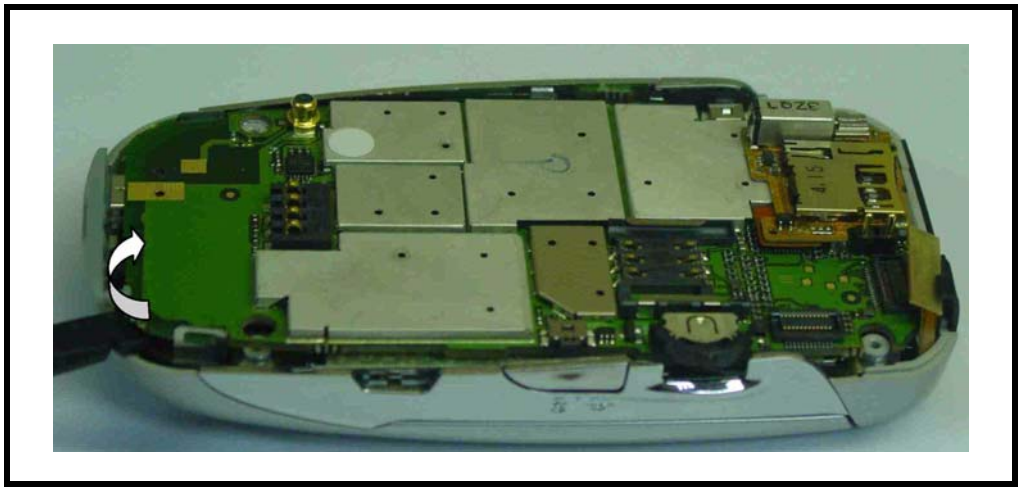


Figure 7. Removing the transceiver PC board assembly

4. To replace, insert the transceiver board assembly into the front housing with the flex connector on top.

Be sure the side buttons are correctly positioned in relation to the corresponding switches on the transceiver board. Verify operation of the buttons after replacing the transceiver board and rear chassis assembly.

5. Insert the flex connector squarely into its mating connector on the transceiver board and press firmly until it snaps into place.
6. Replace the rear housing, SIM card, stylus, battery, and battery cover as described in the procedures.

Removing and Replacing the LCD

This product contains static-sensitive devices. Use anti-static handling procedures to prevent electrostatic discharge (ESD) and component damage.

1. Remove the battery cover, battery, SIM card, stylus, rear housing and the transceiver board assembly as described in the procedures.

The flexible printed cable (FPC) (flex) is easily damaged. Exercise extreme care when handling.

2. Carefully work the flat end of the disassembly tool under the LCD flex connector and remove the connector from the transceiver board. See Figure 8.

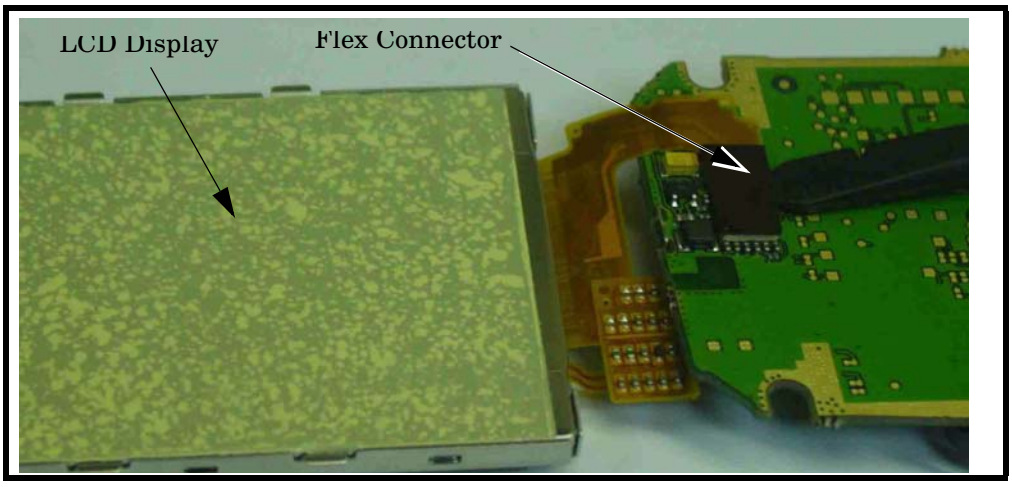


Figure 8. Disconnecting the LCD Flex Connector from the Transceiver Board

3. To replace, Insert the LCD flex connector squarely into its mating connector on the transceiver board and press firmly until it snaps into place. Fold the LCD over onto the transceiver board.
4. Replace the transceiver board, rear housing, SIM card, stylus, battery, and battery cover as described in the procedures.

Removing and Replacing the Flip Assembly

1. Remove the battery cover, battery, SIM card, stylus, rear housing, and transceiver board assembly as described in the procedures.
2. Insert the disassembly tool between the flip assembly and the flip knuckle.
3. Carefully and gently bend the front housing knuckle away from the flip assembly hinge to separate the flip assembly from the front housing.
4. Carefully lift the flip assembly away from the front housing assembly.
5. Carefully thread the flip assembly flex cable through the slot in the front housing assembly.

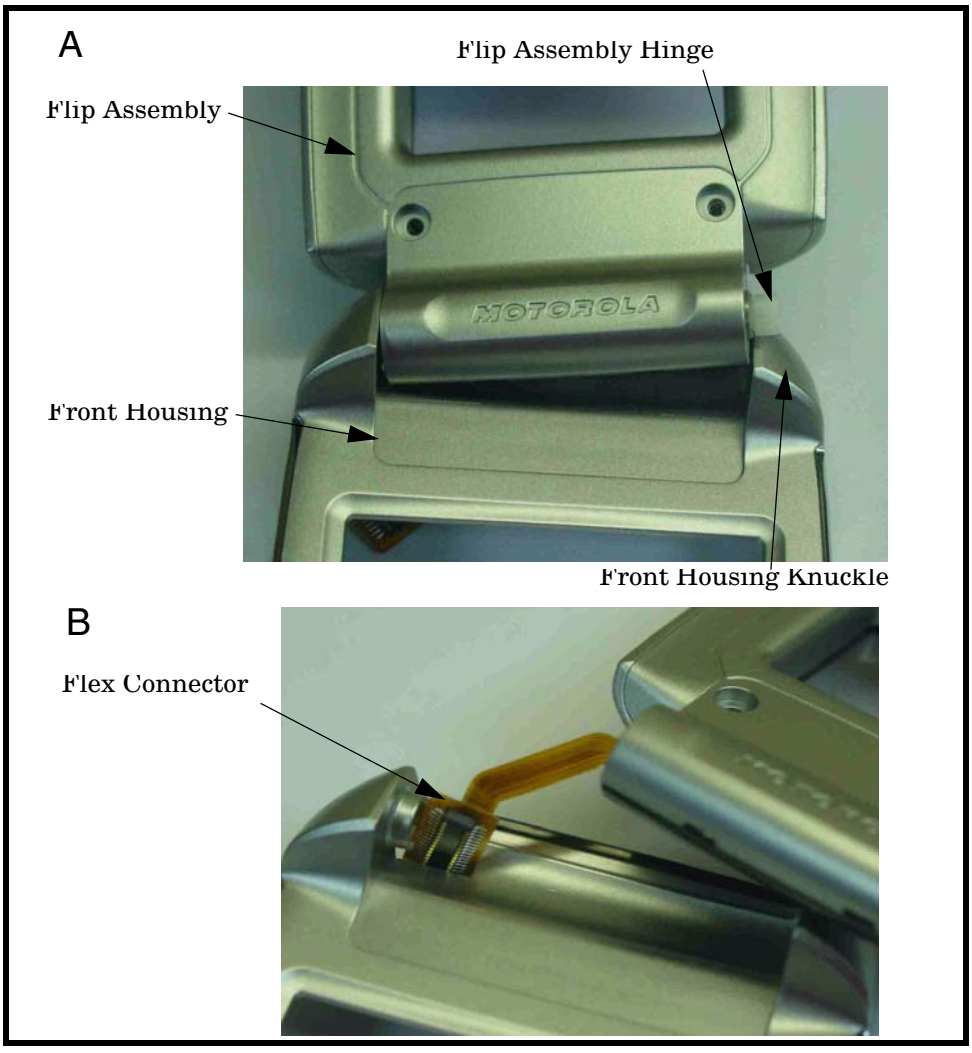


Figure 9. Removing the Flip Assembly

6. To replace, carefully thread the display flex cable through the slot in the front housing.
7. Insert the side of the hinge of the flip assembly with the flex cable into the knuckle.

8. Gently slide the other end of the flip hinge into position into the knuckle.
9. Replace the transceiver board assembly, rear housing, stylus, SIM card, battery, and battery cover as described in the procedures.

Removing and Replacing the Flip Lens

1. Remove the battery cover, battery, SIM card, stylus, rear housing, and transceiver board assembly, and flip assembly as described in the procedures.
2. Use the metal tweezers to remove the 2 rubber screw covers at the base of the flip. Retain the screw covers for reassembly.
3. Using a Torx driver with a T-6 bit, remove the 2 screws at each corner of the unit. Retain the screws for reassembly. See Figure 10a.
4. Using the disassembly tool, gently pry the lens up from the flip assembly at the 2 insert ports. See Figure 10b.

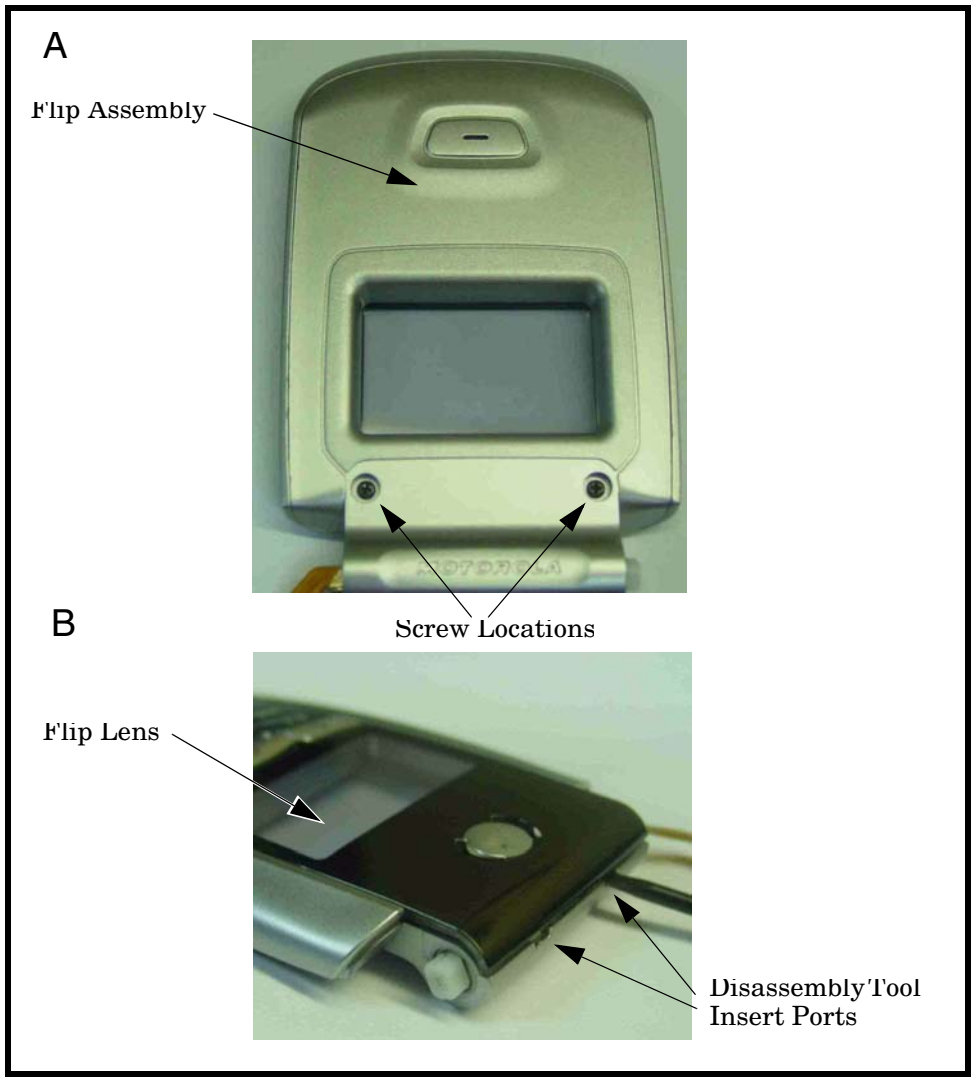


Figure 10. Removing the Flip Lens

5. To replace, the protective adhesive paper from the lens.
6. Insert the bottom of the lens in first and press it on to the flip assembly until it snaps in to place.

7. Replace the 2 screws and tighten to a final torque setting of 1.5 inch pounds. Do not over tighten.
8. Replace 2 rubber screw covers.
9. Replace the flip assembly, transceiver board assembly, rear housing, stylus, SIM card, battery, and battery cover as described in the procedures.

Removing and Replacing the Flip Inner Cover

1. Remove the battery cover, battery, SIM card, stylus, rear housing, and transceiver board assembly, and flip assembly as described in the procedures.
2. Use the metal tweezers to remove the 2 rubber screw covers at the base of the flip. Retain the screw covers for reassembly.
3. Using a Torx driver with a T-6 bit, remove the 2 screws at each corner of the unit. Retain the screws for reassembly.
4. Using the disassembly tool, gently pry the flip cover from the flip assembly disengaging the flip inner cover latches. See Figure 11.

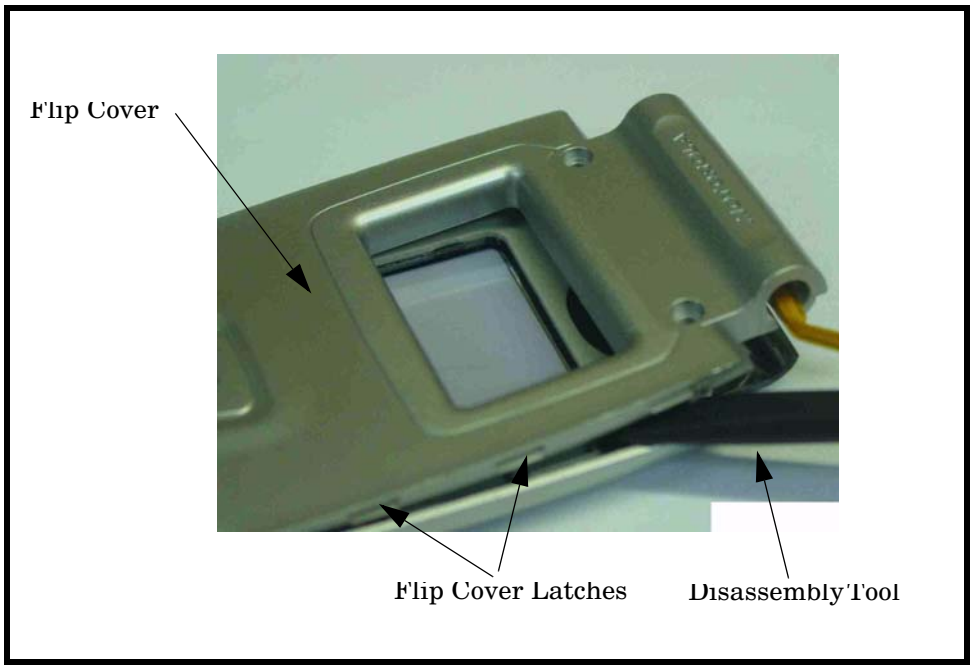


Figure 11. Removing the Flip Inner Cover

5. To replace, position the flip inner cover on to the flip assembly and press until all of the flip cover latches snap into place.
6. Replace the 2 screws and tighten to a final torque setting of 1.5 inch pounds or. Do not over tighten.
7. Replace 2 rubber screw covers.
8. Replace the flip assembly, transceiver board assembly, rear housing, stylus, SIM card, battery, and battery cover as described in the procedures.

Removing and Replacing the Keypad PCB Assembly

1. Remove the battery cover, battery, SIM card, stylus, rear housing, and transceiver board assembly, flip assembly, and flip inner cover as described in the procedures.
2. Remove the 2 screws securing the keypad PCB assembly. Retain the screws for reassembly. See Figure 12a.
3. Using the disassembly tool, gently lift up the keypad PCB assembly and disconnect the flex connector. See Figure 12b.

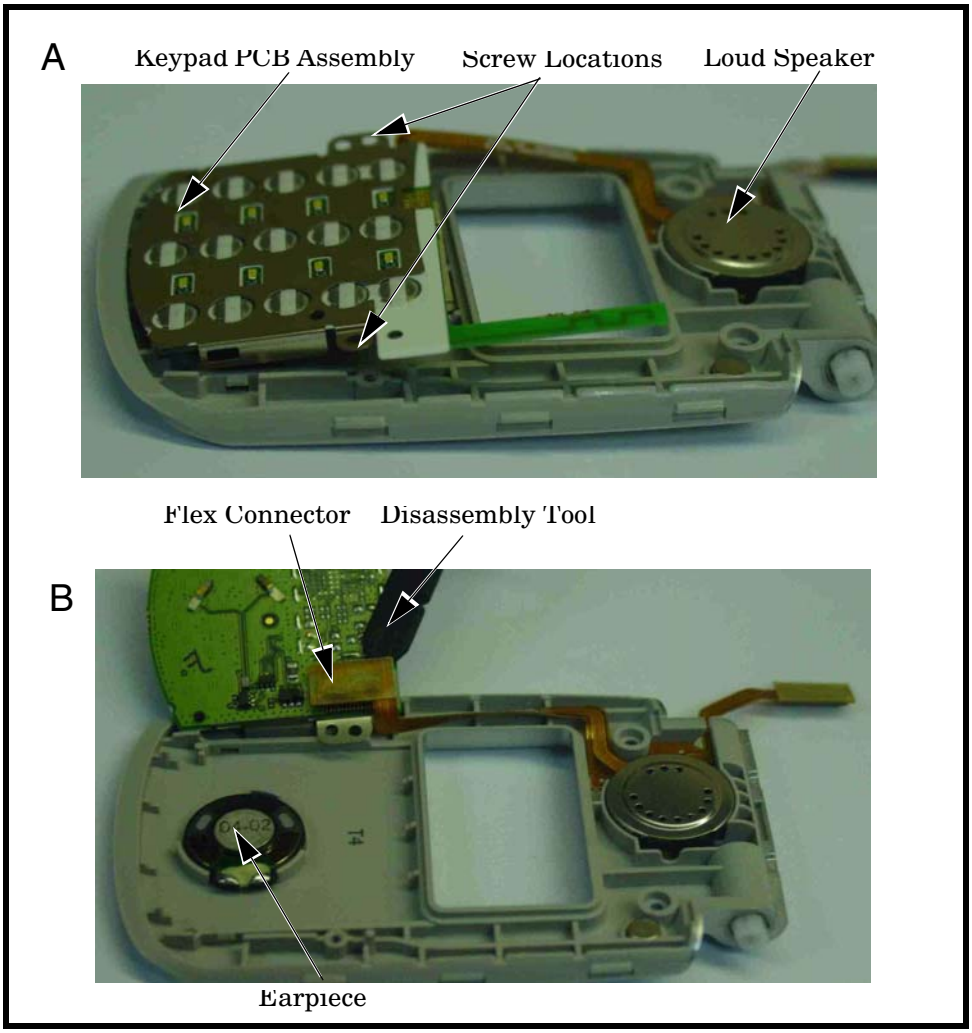


Figure 12. Removing the Keypad PCB Assembly

4. To replace, insert the flex connector squarely into its mating connector on the back of the keypad PCB assembly and press firmly until it snaps into place.
5. Replace the 2 screws securing the keypad PCB assembly and tighten to a final torque setting of 1.5 inch pounds. Do not over tighten.
6. Reassemble and replace the flip assembly, transceiver board assembly, rear housing, stylus, SIM card, battery, and battery cover as described in the procedures.

Removing and Replacing the Stand_Joystick Assembly

1. Remove the battery cover, battery, SIM card, stylus, rear housing and the transceiver board assembly as described in the procedures.

The flexible printed cable (FPC) (flex) is easily damaged. Exercise extreme care when handling.

2. Carefully disengage the 2 metal clips securing the stand_joystick assembly to the transceiver board.
3. Carefully work the flat end of the disassembly tool under the flex connector and remove the connector from the transceiver board. See Figure 13. (Note: It is not necessary to remove the LCD display, it has been removed in Figure 13 for clarity).

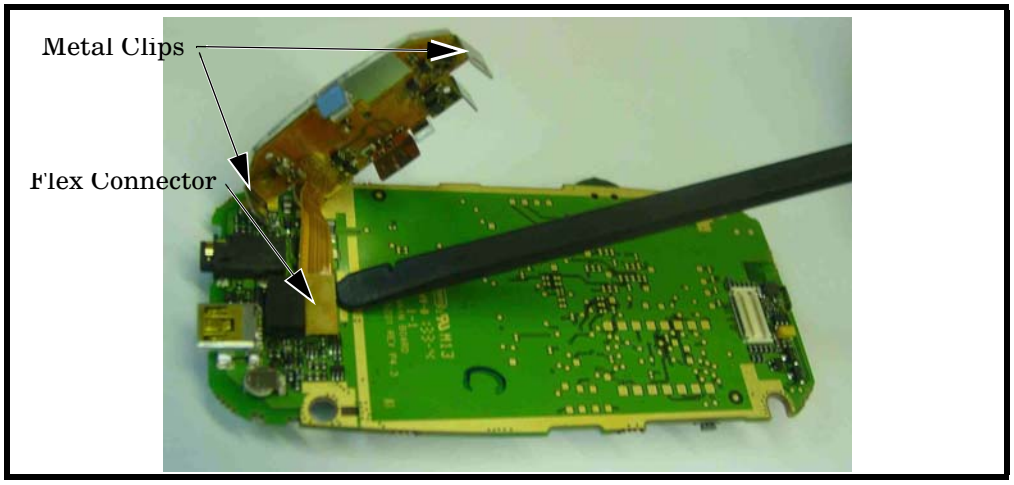


Figure 13. Disconnecting the Stand_Joystick Assembly from the Transceiver Board

4. To replace, insert the flex connector squarely into its mating connector on the transceiver board and press firmly until it snaps into place. Position the stand_joystick assembly over the bottom end of the transceiver board and snap the 2 metal clips onto the sides of the transceiver board.
5. Replace the transceiver board, rear housing, SIM card, stylus, battery, and battery cover as described in the procedures.

Removing and Replacing the Stand_TransFlash Assembly

1. Remove the battery cover, battery, SIM card, stylus rear housing, and transceiver board assembly as described in the procedures.
2. Disengage the metal clip securing the Stand_TransFlash assembly to the transceiver board assembly.
3. Use the disassembly tool to carefully pry the flex connector from its mating connector on the transceiver board (see Figure 14).

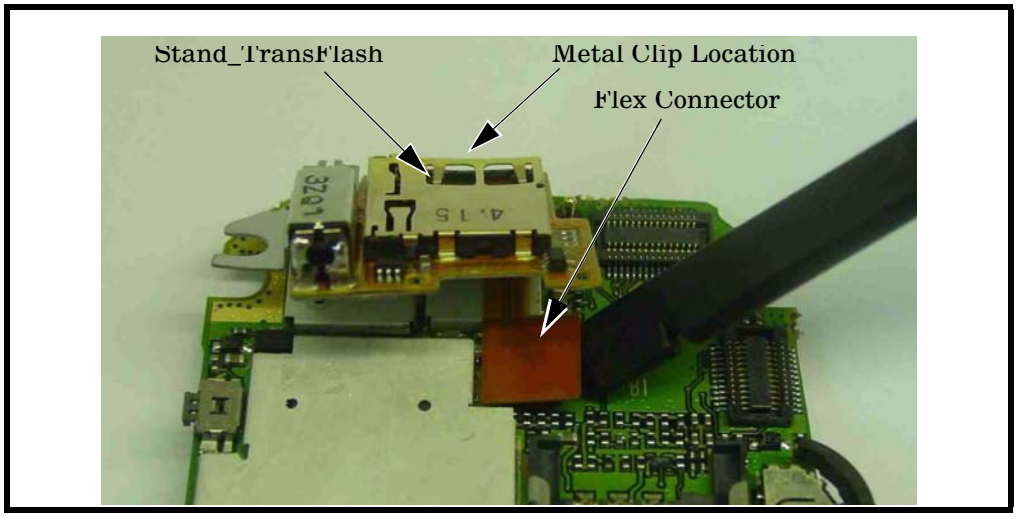


Figure 14. Removing the Stand_TransFlash Assembly

4. To replace, insert the flex connector squarely into its mating connector on the transceiver board and press firmly until it snaps into place.
5. Position the stand_TransFlash assembly over the top end of the transceiver board and snap the metal clip onto the top of the transceiver board.
6. Replace the transceiver board, rear housing, stylus SIM card, battery, and battery cover as described in the procedures.

Removing and Replacing the Camera Assembly

1. Remove the battery cover, battery, SIM card, stylus, rear housing, and transceiver board assembly as described in the procedures.
2. Use the disassembly tool to carefully pry the camera flex connector from its mating connector on the transceiver board (see Figure 15).

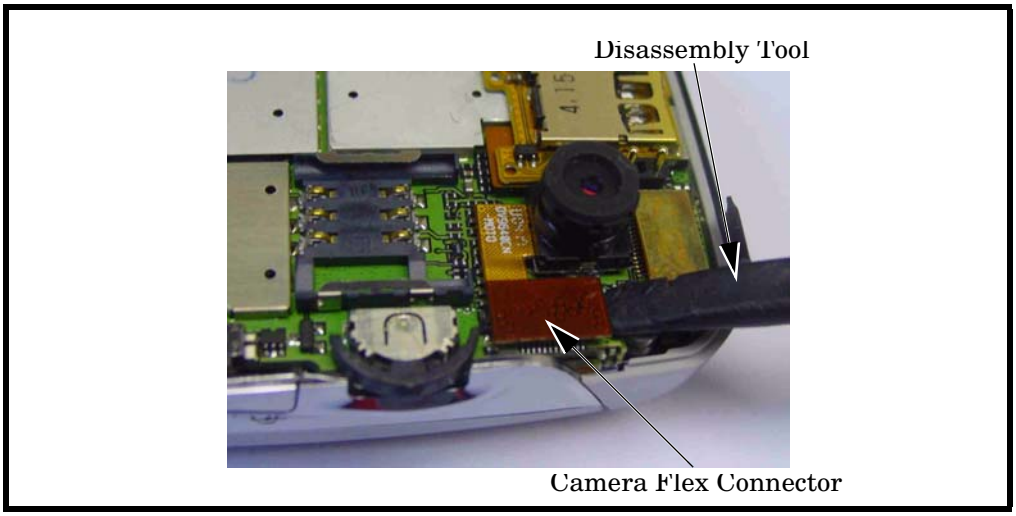


Figure 15. Removing the Camera Assembly

3. To replace, insert the camera flex connector squarely into its mating connector on the transceiver board and press firmly until it snaps into place.
4. Replace the transceiver board, rear housing, stylus, SIM card, battery, and battery cover as described in the procedures.

Subscriber Identity Module (SIM) and Identification

SIM Card

A SIM is required to access the existing local GSM network, or remote networks when traveling (if a roaming agreement has been made with the provider).

The SIM contains:

- All the data necessary to access GSM services.
- The ability to store user information such as phone numbers.
- All information required by the network provider to provide access to the network.

Personality Transfer

A personality transfer is required when a phone is express exchanged or when the main board is replaced. Personality transfers reproduce the customer's original personalized details such as menu and stored memory such as phone books, or even just program a unit with basic user information such as language selection. A780 telephones use TrueSync® synchronization software to effect a personality transfer.

Identification

Each Motorola GSM device is labeled with a variety of identifying numbers. The following information describes the current identifying labels.

Mechanical Serial Number (MSN)

The Mechanical Serial Number (MSN) is an individual unit identity number and remains with the unit throughout the life of the unit.

The MSN can be used to log and track a unit on Motorola's Service Center Database.

The MSN is divided into 4 sections as shown in Figure 16.

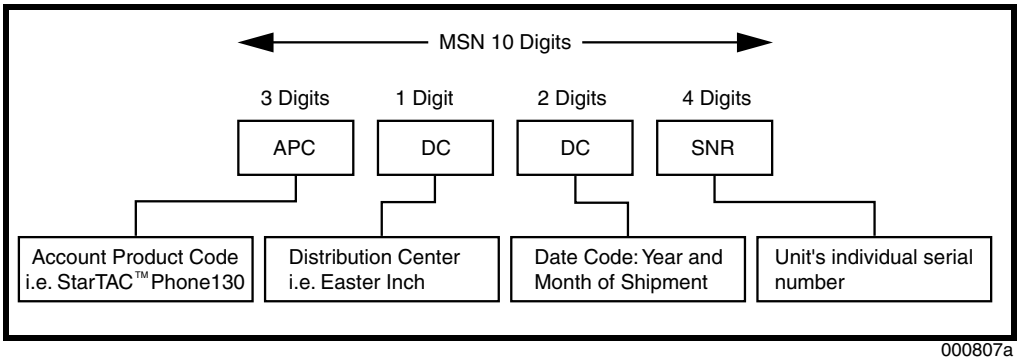


Figure 16. MSN Label breakdown

International Mobile Station Equipment Identity (IMEI)

The International Mobile station Equipment Identity (IMEI) number is an individual number unique to the PCB and is stored within the unit's memory.

The IMEI uniquely identifies an individual mobile station and thereby provides a means for controlling access to GSM networks based on mobile station types or individual units. The full IMEI structure is listed in Table 2.

Table 2. IMEI Number Breakdown

TAC	Serial Number	Check Digit
NNXXXX YY	ZZZZZZ	A

Where

TAC Type Allocation Code, formerly known as Type Approval Code

NN Reporting body identifier

XXXX Type Identifier

YY YY is set to 00 from 01/01/2003 until 31/03/2004

ZZZZZZ Individual unit serial number

A Phase 1 = 0.
Phase 2 = check digit defined as a function of all other IMEI digits

Other label number configurations present are:

- **TRANSCEIVER NUMBER**: Identifies the product type. Normally the SWF number. (i.e. V100).
- **PACKAGE NUMBER**: Identifies the equipment type, mode, and language in which the product is shipped.

Troubleshooting

Manual Test Mode

Motorola A780 telephones are equipped with a manual test mode capability. This allows service personnel to verify functionality and perform fault isolation by entering keypad commands.

To enter the manual test command mode, a GSM / DCS test SIM must be used.

1. Press ⏻ to turn the phone OFF.
2. Remove the battery as described in the procedures.
3. Remove the customer's SIM card from the phone as described in the procedures.
4. Insert the test SIM into the SIM slot.
5. Replace the battery as described in the procedures.
6. Press ⏻ to turn the phone ON.

Manual Test Mode Commands

To display the Test menu, press and hold the (#) key for 3 seconds. Then follow the Test instructions.

Troubleshooting Chart

Table 3. A780 Telephone: Level 1 and 2 Troubleshooting Chart

SYMPTOM	PROBABLE CAUSE	VERIFICATION AND REMEDY
1. Telephone will not turn on or stay on.	a) Battery either discharged or defective.	Measure battery voltage across a 50 ohm (>1 Watt) load. If the battery voltage is <3.25 Vdc, recharge the battery using the appropriate battery charger. If the battery will not recharge, replace the battery. If battery is not at fault, proceed to b.
	b) Battery connectors open or misaligned.	Visually inspect the battery connectors on both the battery and the telephone. Realign and, if necessary, either replace the battery or refer to a Level 3 Service Center for the battery connector replacement. If battery connectors are not at fault, proceed to c.
	c) Transceiver board assembly defective.	Remove the transceiver board assembly. Substitute a known good assembly and temporarily reassemble the unit. Press and hold the PWR button; if unit turns on and stays on, disconnect the dc power source and reassemble the telephone with the new transceiver board assembly. Verify that the fault has been cleared. If the fault has not been cleared then proceed to d.
	d) keyboard assembly failure.	Replace the keyboard assembly. Temporarily connect a +3.6 Vdc supply to the battery connectors. Press and hold the PWR button. If unit turns on and stays on, disconnect the dc power source and reassemble with the new keyboard assembly.
2. Telephone exhibits poor reception or erratic operation such as calls frequently dropping or weak or distorted audio.	a) Antenna assembly defective.	Check to make sure that the antenna pin is properly connected to the transceiver board assembly. If connected properly, substitute a known good antenna. If the fault is still present, proceed to b.
	b) Transceiver board assembly defective.	Replace the transceiver board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board assembly.
3. Display is erratic, or provides partial or no display.	a) Transceiver board connections faulty.	Remove rear chassis assembly from unit, check general condition of flexible printed cable (flex). If the flex is good, check that the flex connector is fully pressed down. If not, check connector to transceiver board connections. If faulty connector, replace the transceiver board assembly. If connector is not at fault, proceed to b.
	b) LCD module defective.	Temporarily replace the LCD module with a known good assembly. If fault has been cleared, reassemble with the new LCD module. If fault not cleared, proceed to c.
	c) Transceiver board assembly defective.	Replace the transceiver board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board assembly.

Table 3. A780 Telephone: Level 1 and 2 Troubleshooting Chart (Continued)

SYMPTOM	PROBABLE CAUSE	VERIFICATION AND REMEDY
4. Incoming call alert transducer audio distorted or volume is too low.	Faulty transceiver board assembly.	Replace the transceiver board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board assembly.
5. Telephone transmit audio is weak. (usually indicated by called parties complaining of difficulty in hearing voice).	a) Microphone connections to the transceiver board assembly defective.	Gain access to the microphone as described in the procedures. Check connections. If connector is faulty proceed to c; if the connector is not at fault, proceed to b.
	b) Microphone defective.	Gain access to microphone. Disconnect and substitute a known good microphone. Place a call and verify improvement in transmit signal as heard by called party. If good, reassemble with new microphone. If microphone is not at fault, reinstall original microphone and proceed to c.
	c) Transceiver board assembly defective.	Replace the transceiver board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board assembly.
6. Receive audio from earpiece speaker is weak or distorted.	a) Connections to or from transceiver board assembly defective.	Gain access to the transceiver board assembly as described in the procedures. Check flex and the flex connector from the flip assembly to the transceiver board assembly. If flex is at fault, replace flip assembly. If flex connector is at fault, proceed to c.
	b) Antenna assembly defective.	Check to make sure the antenna is installed correctly. If the antenna is installed correctly, substitute a known good antenna assembly. If this does not clear the fault, reinstall the original antenna assembly and proceed to c.
	c) Transceiver board assembly defective.	Replace the transceiver board assembly (refer to 1c). Verify that the fault has been cleared and reassemble with the new transceiver board assembly.
7. Telephone will not recognize or accept SIM.	a) SIM defective.	Check the SIM contacts for dirt. Clean if necessary and check if fault has been cleared. If the contacts are clean, insert a known good SIM into the telephone. Power up the unit and confirm that the SIM has been accepted. If the fault no longer exists, replace the defective SIM. If the SIM is not at fault, proceed to b.
	b) Transceiver board assembly defective.	Replace the transceiver board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board assembly.
8. Phone does not sense when flip is opened or closed (usually indicated by inability to answer incoming calls by opening the flip, or inability to make outgoing calls).	a) Flip assembly defective.	Temporarily replace the flip assembly with a known good assembly. If fault has been cleared, reassemble with the new flip assembly. If fault not cleared, proceed to b.
	b) Transceiver board assembly defective.	Replace the transceiver board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board assembly.
9. Vibrator feature not functioning.	Vibrator flex, wing PCB, or the main transceiver board assembly	Replace the defective component. Verify that the fault has been cleared and reassemble the unit with the new transceiver board assembly.

Table 3. A780 Telephone: Level 1 and 2 Troubleshooting Chart (Continued)

SYMPTOM	PROBABLE CAUSE	VERIFICATION AND REMEDY
10. Internal Charger not working.	Faulty charger circuit on transceiver board assembly.	Test a selection of batteries in the rear pocket of the desktop charger. Check LED display for the charging indications. If these are charging properly, then the internal charger is at fault. Replace the transceiver board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board assembly.
11. Real Time Clock resetting when standard battery is removed.	Lithium button cell in the display board may be depleted.	Refer service to a Level 3 service center for replacement.
12. No or weak audio when using headset.	a) Headset not fully pushed home.	Ensure the headset plug is fully seated in the connector socket. If fault not cleared, proceed to b.
	b) Faulty connector socket on transceiver board assembly.	Replace the transceiver board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board assembly.

Programming: Software Upgrade and Flexing

Contact your local technical support engineer for information about equipment and procedures for flashing and flexing.

Part Numbers

The following information is provided as a reference for the parts associated with A780 telephones.

Related Publications

Motorola A780 User's Guide, English	6809489A49-O

Exploded View Diagram

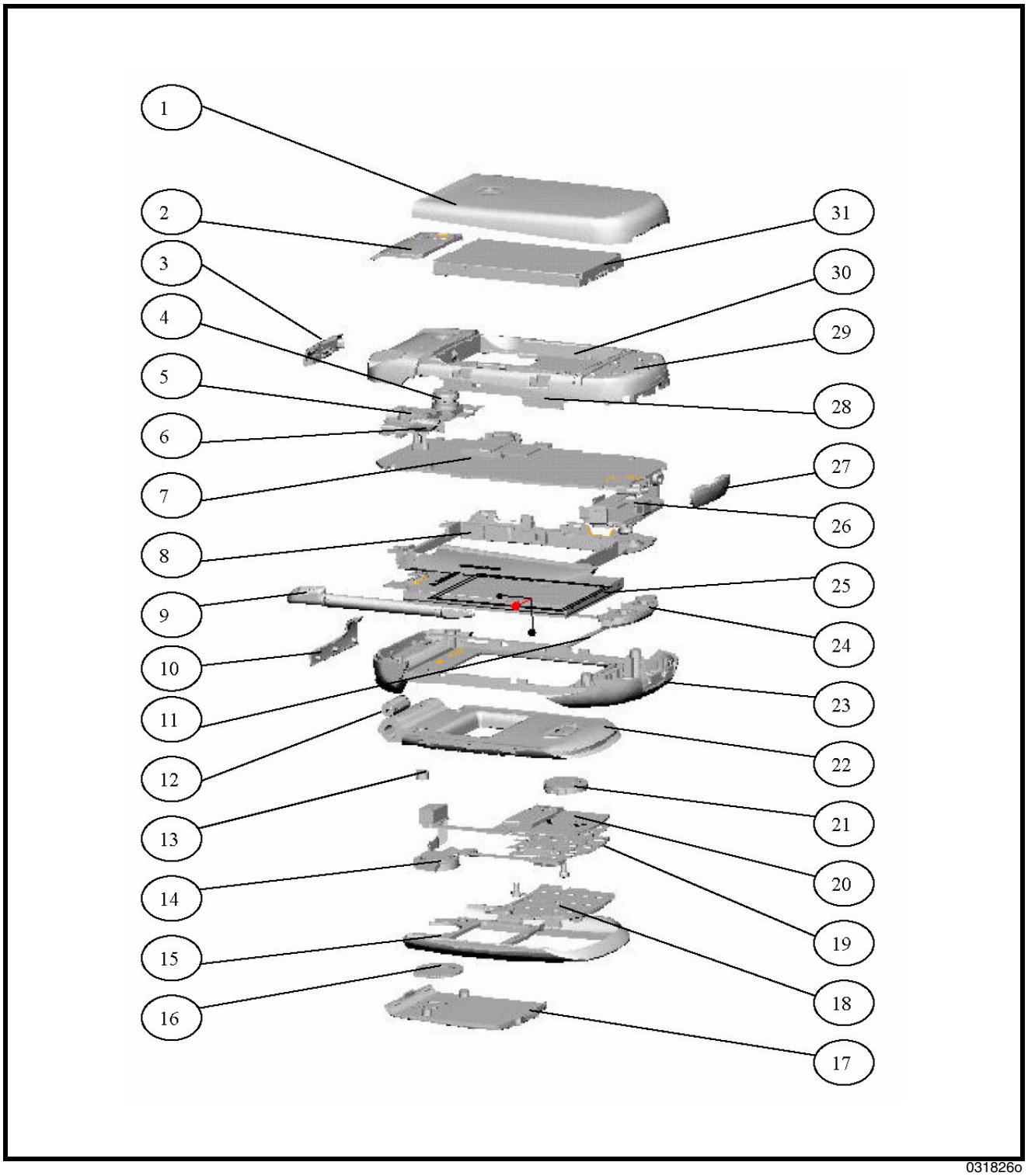


Figure 17. Exploded View Diagram

Exploded View Parts List

Table 4. Exploded View Parts List (A780)

Item Number	Part Number	Description
1	1588187Z02	Battery Door
2	6188252Z01	Camera Lens
3	3888188Z01	Tri-flash Cover
4	0164099E02	Camera Module
5	0164032T01	Tri-flash Holder Assembly
6	3888189Z01	Camera Button
7	CHYN4611AA	Core Set
8	0164027T02	Main Shift Assembly
9	0188181Z01	Stylus
10	1588185Z01	Front Head
11	7588199Z01	LCD Cushion
12	5588238Z01	Hinge
13	5988236Z01	Magnet
14	0614029T01	Flip Flex Assembly
15	1588179Z02	Flip Outer
16	7588234Z01	Cushion for Loud Speaker
17	6188212Z01	CLI Lens
18	3888237Z02	Dial Keypad
19	0788211Z01	Flip Metal Frame
20	CHLF4568AA	Flip PCB Assembly
21	5087975K02	Receiver
22	1588182Z02	Flip Inner
23	1588160Z02	Front Housing
24	3888191Z02	Home Keypad
25	7290238N01	LCD Module
26	0164099E03	Stand_Joystick Assembly
27	3888191Z01	Car-kit Cover
28	3888192Z01	Side Button
29	8588242Z01	Quad-band Antenna Assembly
30	1588196Z02	Rear Housing
31	SNN5683A	Battery

To order parts please use the following Link:

https://wissc.motorola.com/wissc_root/main/BrowserOK.html

(Password is Required)

For information on ordering parts please contact EMEA at + 49 461 803 1639.

There is a danger of explosion if the Lithium Ion battery pack is replaced incorrectly. Replace only with the same type of battery or equivalent as recommended by the battery manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Accessories

Table 5. Accessories

Part Description	Part Number
Headset, FM stereo radio	xxxxxx
Headset, with send/end button	xxxxxx
Headset, retractable	xxxxxx
Neckloop, hands-free (compatible with T-coil hearing aids)	xxxxxx
Holster	

S

T

V

W

Personal Communications Sector,
Sawgrass International Concourse
789 International Parkway, Mailstop S2C
Sunrise, FL 33325-6222

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